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ABSTRACT

Recognizing the need to promote hands-on learning opportunities and inquiry-based instructional programs in science at the elementary school level, a consortium made up of local school districts and Cook College of Rutgers University has proposed the development of a teacher retraining center. The program would be developed in three stages. Initial planning would begin in January, prior to the school year beginning in September, during which time pilot schools would be selected, the training center framework would be developed, and materials and equipment would be acquired. During stage two the training center would become operational. Supervisors and key teaching staff from the pilot schools would be trained by university staff in the teaching techniques involved in process oriented inquiry learning. In stage three, the key personnel trained in stage two would then begin applying newly developed learning strategies, methodologies, and curriculum. Also discussed in the document are possible strategies for utilizing the resources of the Teacher Retraining Center in the preservice education of undergraduate elementary education majors. (TW)

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"Hands On" Elementary Science Teaching:

A Teacher Retraining Consortium Model

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In a recent report on elementary education.William J.Bennett,U.S.Secretary of Education,called for "revolution" in the way science is taught to elementary school children. Douglas E. Lapp ,Executive Director of the National Science Resources Center,recently concurred with Bennett's contention and added that most science educators agree as well that science is a way of thinking and that its teaching must be enlivened to give children a grasp of the "Scientific Method " of reasoning and discovery. Lapp went on to note that nothing stimulates children more than activity based, "hands on" learning programs. He noted that kids are frequently turned off to reading out of a science textbook because the words are too hard. Dr.Thomas C.Fitch, a professor of science education in Illinois State University,goes further. Fitch,a National Science Foundation recipient sponsoring a project designed to upgrade science teaching in Illinois elementary schools,noted that a second grader could put a glass of water on a window ledge and,measuring it over a week,fully understand the concept of evaporation far better than any text-book explanation. In a 1980 study that reviewed teaching materials and methods, Hurd et. al. noted that Biology teachers lecture more than 75% of the time, so little time is left for inquiry. Almost all questions in the classroom arose from inform-ation in the textbook, and most centered on terminology and definitions. Hurd,went on to note that teachers relied heavily on, and believed in textbooks, and that students were trained to seek the "right answers" from textbooks. In conclusion, Hurd noted that the common sequence of instruction today is to first

assign, next recite, test, discuss the test, and then resort back to the textbook to ascertain why student performance was below expectation.

Recognizing the critical need to promote greater hands-on learning opportunities, especially at the elementary level, Cook College, in cooperation with the Middlesex County Superintendent's Office, and the East Brunswick Public School District,proposes the establishment of a Teacher Retraining center on the Cook College campus of Rutgers University.

For over ten years, the Cook Department of Environmental Education has utilized the concept of "hands-on" learning in its undergraduate teacher education courses. The Department s nationally award winning interdisciplinary Environmental Education Institute succeeded in providing educators K-12 with a "hands-on" approach to Environmental Education. Over 250 teachers participated in the program during its five years of existence.

East Brunswick, during this same period of time, developed a science program in grades 1-6 that closely applies the philosophies and processes alluded to in the cited literature. The program patterns itself with the developmental learning sequencing advocated by Piaget. The ordered series of learning experiences are designed to guide the student through activities and units of study that continually reinforce the "scientific method" and the concepts of inquiry and/or discovery learning.

The major difficulty in the maintenance of such a program is the continual requirement for training new elementary staff. Science education is rarely a substantial part of an elementary

teacher's education. An approach that emphasizes minimum use of textbook type materials makes the process even more difficult.

When one reviews present approaches to teacher training programs, the emphasis is always placed on the teacher and follow-ups only occur during the teacher/student contact with the course and the professor. Once the teacher becomes a part of, or returns to, an educational system the demands of administrative procedure have a tendency to override philosophical expertise. The teaching process usually becomes one of the educational ritual of read,test,review,etc. Too often the elementary science program becomes an extension of the reading curriculum with actual science learning experiences relegated to a secondary and more likely non-existent role.

The model proposed suggests a process that could break the chain of events while creating discovery learning experiences supported by supervisory staff leadership and training, curriculum modification, teacher retraining, and high-tech curriculum implementation. A Retraining Center at the University level would be at the hub of all activities. The facility would have functionality for retraining of professional staff as well as for the training of students at the university planning to enter the educational profession. All materials compiled, developed, and disseminated to the teachers would emphasize the values, philosophy, and practicality of "Hands-on" learning methodologies.

The program would be developed in three stages. Assuming that the center would become operational in September of a given school year, initial planning would begin in January of that

year. The University, the County Superintendants office, and the piloting school districts would provide key personnel for primary planning. During stage one pilot school districts would be selected from both urban and suburban school systems located within the jurisdiction of the county . The University Training Center framework would also be developed during phase one. Computers, equipment, software, packaged programs (eg. ESS,SCIS), existing curricula, and science materials would be located and acquired during this phase.

During stage two, the training center would become operational. Supervisors and key teaching staff from the piloting districts would be trained by university staff in the techniques involved in process oriented, inquiry learning. The training would be based on the philosophies associated with student oriented learning experiences and would emphasize the development and implementation of teaching techniques and strategies rather then sample lessons. Curriculum, while essential in the learning process would play a secondary role to teaching technique. It is anticipated that by mid-session the group would begin to investigate the materials located at the center and would then begin to design the program which would ultimately serve as the teaching vehicle to be field tested by the group.

In stage three, these key district level personnel would then begin applying the newly developed learning strategies, methodologies, and designed curriculum under field conditions. Periodic reinforcement and modification meetings at the center

would be essential for continuity to be maintained. During this same phase of the program the elementary teachers from the piloting districts would begin coursework at the University Training Center. Once the teachers become acclimated with the process of inquiry learning they could then begin the implementation of learned techniques under the guidance of the supervisor and key personnel of the sending district that have completed the implementation of the approach and have practiced

As the last phase is fully implemented at the center, the facility would contain an extensive collection of up-to-date, high-tech resources available. This would therefore provide an ideal collection for University students majoring in education. All students involved in the institution's elementary teacher training program could become active users and contributers of the center's materials. The districts involved in the center's retraining courses could then become the field service schools for the student teaching program of the university.

In a recent article entitled, "Why Isn't Inquiry Used More in the Classroom?", Costenson and Lawson noted ten reasons most frequently given for not using inquiry in the classroom. Most frequently cited reasons included time and energy, the process was too slow, student immaturity, and teaching habits were too well patterned in existing approaches. However, impressive evidence as to the superiority of inquiry-oriented teaching methods grow ever more abundant. A new thrust in education is needed to immediately strengthen the skills and increase the interest of elementary students and their teachers in science. This new thrust should focus on the student and his/her learning

processes.

The key rests in the hands of the elementary teachers. They build the foundation on which all other levels are constructed. They must learn to understand what the process of scientific inquiry is; they must have sufficient understanding of the models involved and they must become better skilled in the techniques of inquiry teaching. Only then can education meet the future head-on.